

QTC

The Radio Amateur Society of Australia
August 2023

Build a Six Metre QUAD in Two Hours
Six Metres - How We Got Here

Rotators - Renew or Refurbish?
PerthTech Coming Up in October
An 80 Metre Dipole Using Balloons

ACMA Class License Arrangements
RASA Responds



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RASA AGM & ELECTION for 2023

The 2023 AGM for RASA is on Saturday, 23rd September 2023 at 10:00am Eastern Standard Time.

As with previous years the meeting will be streamed live and recorded on YouTube, with links being sent to all RASA members shortly before proceedings commence.

No positions received more than one nomination, so no ballot is needed.

The Office Bearers are:

- President: Paul Anslow VK2APA
- Vice President: Robert (Bob) Bristow VK6POP
- Treasurer: Ian Jackson VK3BUF
- General Secretary: Andrew Beales VK4KCS
- Admin Secretary: (Action) Ian Jackson VK3BUF

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You are welcome to join RASA or simply make a donation to support our work.

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Contributing Items For QTC Magazine

QTC Magazine welcomes contributions for future editions. When planning to submit an article, please read our submission guidelines first.

Following the guidelines will save you and the editing team a lot of time and effort. The guidelines are [HERE](#)

Cover picture credit:

Ian VK3BUF took this photograph during the refurbishing of his antenna rotator. You can read about this project in this issue of QTC.



President's Column



Paul VK2APA
President
The Radio Amateur Society
of Australia

Spring is a season regarded in most cultures as a time of renewal and rebirth.

It's a time of freshness and new growth. The plants, shrubs and trees all around are bursting into life. Even the weeds. This all comes after winter, a period of dormancy.

You have probably guessed by now that I'm about to become metaphorical. And I am.

The seasons we live through are a fitting basis for comparisons of the life of aspects of our humanity - things we do. In our case it's our hobby of Amateur Radio.

If ever we were under the influence of a season, now would be winter.

A hundred years ago, Amateur Radio was in its springtime, growing steadily, attracting huge public interest and admiration. Amateur Radio was there in the birth of broadcast radio, and we went our separate ways when commercial interests entered the broadcast sphere.

Amateur Radio was reported in mainstream newspapers, and syndicated to the myriad regional papers around the country. There were regular newspaper columns about Amateur Radio. The public thought we were marvelous, because we were breaking new ground.

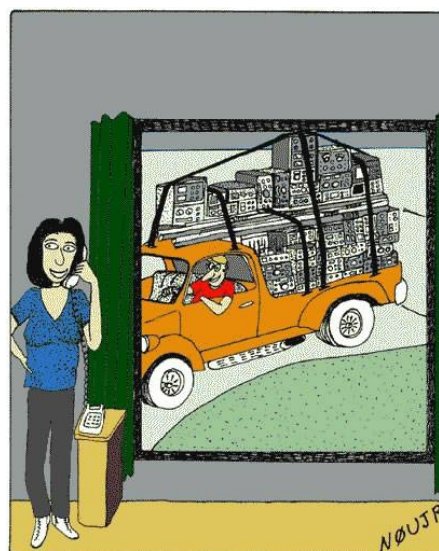
When did the Autumn of Amateur Radio begin? I'm not sure, but I think it may have been sometime after World War Two, when we suddenly dropped out of mainstream media. That's not to say that Amateur Radio stopped doing great stuff, but it's when we began our descent into the closet. Out of the public eye.

It was a long Autumn season. As mass media grew, and technology developed, men on the moon, and so forth, Amateur Radio no longer had the "wow" that it used to have.

Winter began somewhere along with the rise of social media. Looking back at our metaphor, Amateurs didn't all become dormant, however it became increasingly difficult to have a recognisable presence in modern society, and possibly chiefly because our technology has so much more to compete with in order to garner public interest.

I can't continue this discussion without mentioning the elephant. Because Amateur Radio is governed by laws and regulations and international treaties, we need to have effective collaborative representation from all Amateur Radio organisations to the Government and international agencies that govern Amateur Radio.

However, while personal grudges persist, and the good of the hobby is not paramount in our collective thoughts, we will dwell in Winter.



No, Greg went to the Hamfest today to get rid of a couple of old radios that were cluttering up the place ... Oh I think I hear him pulling up now.

Advertise your next Hamfest, Field Day or special activity to a wider audience on the Hamfests Australasia Facebook Group.

Join the group [HERE](#)

QTC From the Editor



We thought we'd have QST Published by the end of August, however we have spent the last week in "Stop Press" mode, because the ACMA released a series of announcements and consultations about Amateur Radio Licensing, Exams and Assessors, in readiness for the transition to class licensing commencing in 2024

RASA has looked at and discussed the ACMA documents, and intends to make a submission to the regulator in time for the 26th of September deadline.

In the meantime, in this month's QTC we have provided a commentary on the most prominent issues, and we invite the Amateur Radio Community to provide feedback for us to consider, or if you feel so inclined, you can make your own submission to the ACMA via their online form, or by snail mail.

Much of what is being proposed with regard to the class license is fairly straightforward, and we've commented where needed. Some sections are quite vague, and we will be seeking clarification and elimination of ambiguities.

A big bone of contention is the regulator's reluctance to consider granting higher transmitter power, and instead they appear to be going down the road of encouraging the use of Scientific Licenses.

There are some things that must be challenged, and we hope that the other national organisation, the Wireless Institute of Australia, will think likewise. Who knows, they may see the strength in agreeing with us and putting up a joint submission with RASA to the regulator. A joint WIA/RASA submission to the ACMA would have considerable influence.

The invitation to collaborate is always there, and we will extend it again, however while egos overrule common sense, it may never happen. Amateur Radio will be the poorer for it.

RASA will listen to and consider contributions or comments from you while we are compiling our responses to the ACMA.

Although the ACMA issues have taken a lot of space this month, we're still able to offer you a huge assortment of content for your education and entertainment. These include a six metre Quad antenna project, just in time for Standard licensees to join in on 6 metres, a rotator rebuild, and using balloons to create a yagi for 80 and 160 metres.



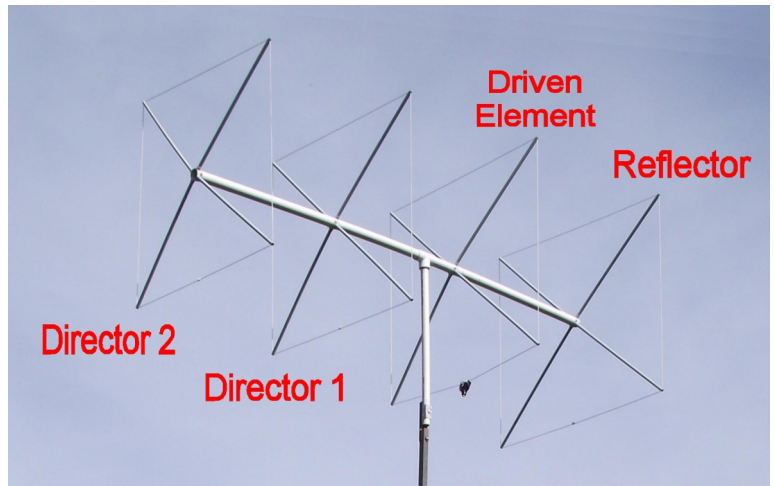
Build a Six Metre Cubical Quad Antenna in Two Hours

By Ian Jackson VK3BUF

Now that Australian Amateurs with a Standard license have been granted access to the 6 metre band, many will have a go at this part of the spectrum for the first time. Arguably it is the most interesting part of the spectrum accessible to Amateurs. It has characteristics of ionospheric propagation, along with the idiosyncrasies of Tropospheric DX in summer months. FM repeaters normally restricted to a 50 km radius sometimes support contacts up to twenty times that distance.

The need for a basic gain antenna for 6M has reached a new operator base. Here is a design of the classic Cubical Quad based entirely on hardware store conduits and PVC pipe.

Construction requires only a hacksaw cordless drill, some conduit glue and a small amount of wire. It may look fragile, but it has weathered some mighty storms on the tower over the past ten years. It is a fun build that takes only a couple of hours to complete.



It can be operated horizontal or vertical. If you leave it with a minimum of screws, it is easily collapsed and packed for field work, or paint it to improve UV resistance when permanently mounted on a mast. SWR was a good 1.2:1 at 52.5MHz with the measurements described in this article.



The boom is made from 60mm (outside diameter) PVC pipe. This is quite rigid and fits nicely into a standard 60mm Tee joiner.

(In the version shown here a reducer down to 48mm pipe was used so that the vertical section could join to a smaller support mast.) The sections were then glued using normal PVC pipe primer and adhesive. While the Tee is not in the exact centre of the boom, this

design makes for a very balanced unit.

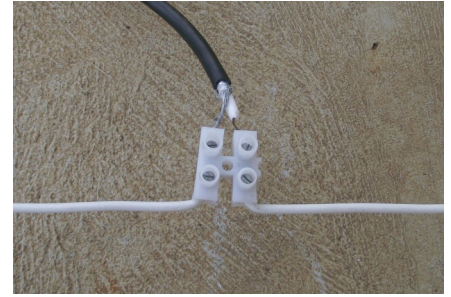
The central hub for each element is made from a standard Clipsal 4-way conduit junction box. (240/20/4DE-GY) This takes standard 20mm PVC electrical conduit, which is used for the spreader arms. To prepare this junction box, remove & discard the lid, then run through the centre of the unit with a 60mm hole saw. If you don't have a 60mm hole saw, either go out and buy one, or drill smaller holes in the base of the junction box and do a lot of filing. A 6mm diameter bolt and wing nut (shown right) is then used to lock the assembly to the boom.



In the ends of the conduit a 4mm diameter hole was inserted to take the 2.5 sq mm insulated building wire. (in practise any old bit of wire will do) A good aspect of this design is that all the structural hardware is non-

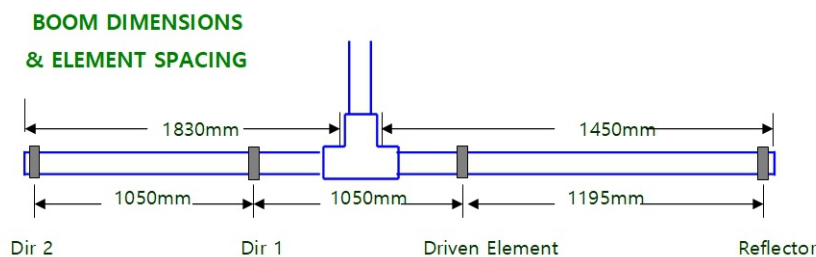
metallic and will not affect the optimal radiation pattern of the completed antenna.

Wires in this model were joined using common electrical joiners. The 2-way block at the feedpoint accommodated a section of RG59 (75 ohm) matching coax. This was later covered in black Butyl Rubber.



The table below shows the lengths for each of the 20mm PVC conduit spreaders and for the wire used in each of the elements of the antenna. The conduit comes in 4-metre lengths, so it will be necessary to purchase four full lengths of this.

| | Reflector | Driven Element | Director 1 | Director 2 |
|-------------------|-----------|----------------|------------|------------|
| Spreader Length | 1000mm | 960mm | 915mm | 850mm |
| Total Wire Length | 5875mm | 5535mm | 5315mm | 4960mm |



The matching method rates a mention here. The feedpoint impedance of a single loop within a parasitic array is around 100 ohms (balanced). Our aim is to convert this to 50 ohms (unbalanced) for coupling to the transceiver on a regular RG8 or RG58 feedline.

The trick is to use a section of RG59 75 ohm coax in line with the antenna cable. A specific portion of a wavelength of coax will convert an impedance higher than the RG59 to an impedance that is lower. In this case it means that you will need to connect 2940mm of RG59 to the feedpoint block and connect the other end directly to RG8 (or RG58), or put a connector on the end. A section of 75 ohm TV coax worked well.

An alternative to the coax feed method is a toroidal 1:1 balun. This is a reasonable alternative, but is not as compact as the coaxial transformation method. At the feedpoint.

I ascended the tower and attached a Sark 110 analyser to the end of the 75 ohm section to get some live VSWR and impedance data. The results were good. Resonance was where I wanted it, at the local 6M repeater input, with a measured VSWR of 1.18 to 1 and an impedance of 57 ohms.

I repeated the test in the shack, at the end of a 25 metre RG213 feedline. Results were similar, except the impedance had fallen to 44 ohms.

As one would expect, It is highly directional. I had taken it portable a few times to help track down a rogue interference source on the input of VK3RWD.

Polarisation is determined by the location of the feedpoint. If the feedline connects to the bottom, you have Horizontal Polarisation. Perfect for SSB. If connected from the side, it is Vertically Polarised, which is ideal for FM repeater and mobile use.

A question sometimes asked about quads is what the advantages are of having the elements in a square shape over a diamond shape. (with a pointy corner closest to the ground.) It seems

that performance wise, differences are minor, except that in colder climates, ice is less likely to build up on the RF sensitive wires in the diamond shaped form. Not much of a factor for most of Australia. One advantage of the square shape is that the spreaders are at 45° and this makes it harder for the cockatoos to land on.

Because the spreader hubs slide onto the boom and are retained by a single bolt and wingnut, the design does lend itself to rapid disassembly for transport purposes. Like all yagi antennas, the front-to-back ratio will vary with the spacing between elements.

Electrically a 4-element Cubical Quad antenna will behave a little like a pair of stacked 4-element Yagi beam antennas, except it has a lower angle of radiation and for those of us that regard an antenna as an art form, quad beams always look impressive.

For this assembly forward gain should be around 10dB over a half-wave dipole. (dBi) Provided there are no overhead powerlines or low bridges in your area, it makes for an interesting mobile antenna.

If you are looking for a weekend project and do want to take advantage of the increased interest in this part of the band, then perhaps this antenna is for you.



The September-October SARC Communicator is now ready to view or download.

The Communicator is the bi monthly journal of the Surrey Amateur Radio Communications group.

It's a high quality Amateur Radio publication from our friends in British Columbia.

The Communicator is available [HERE](#)



ACMA RELEASES THEIR VISION FOR THE FUTURE OF AMATEUR RADIO IN AUSTRALIA

Just as the August QTC was about to be finalised, the ACMA circulated three news updates that will shape the future of Amateur Radio. In February 2024 the current arrangements with the Australian Maritime College (AMC) will cease and the ACMA have announced they will use that date to transition from Apparatus Licences to a Class license. This represents the largest structural shift in Amateur Radio management our hobby has seen since WW2.

On the 29th August a bulletin was released by the ACMA describing their vision of how the examination and assessor network will operate. They seek feedback on their plan before a deadline of the 26th September.

Five minutes later, the ACMA released a second bulletin describing their proposed fee structure for accreditation, qualification and callsign management. This release also seeks sector feedback by the 26th September 26.

The following day, the 30th August, the ACMA released a third document describing changes made to Scientific and Research licensing. This is intended to accommodate Amateurs who wish to operate and experiment with higher power levels.

There is a lot to unpack here. We delayed QTC to include a synopsis of this content and to discuss some of the ramifications of these potential changes.

Links

There is a lot of content in these proposed changes. Readers can follow the links supplied by the ACMA if they wish to read the ACMA position in greater detail.

The links are shown here in full:

Assessor Accreditation and Qualification framework & Class License Arrangements:
[Proposed new amateur radio assessor accreditation and qualification framework | ACMA](#)

Draft Fees & Cost Recovery Implementation Statement consultation
[Proposed 2023–24 fees for service | ACMA](#)

Notice of the introduction of Science & Research Class License legislation
<https://www.legislation.gov.au/Details/F2023L01122>

What does it all mean?

RASA has prepared a synopsis. Where appropriate, we have added some notes and interpretation from the RASA Management Team.

We will also prepare a response to the consultation. We invite Amateurs to send comments about these changes to RASA via vkradioamateurs.org. Alternately, you may wish to upload your own submission to these proposals directly to the ACMA, or send by post to the ACMA at:

Manager – Revenue, Cost Recovery, Budgets and Operations,
Australian Communications and Media Authority,
PO Box 78 Belconnen ACT 2616

Some comment on the process.

We have mixed feelings about the way in which this matter has been handled. The Class License proposal had been in the pipeline for a few years now. It has been delayed by the ACMA more than once.

We have a lot of material, all provided with only twenty five days for Sector consultation and a meaningful reply back to the ACMA. In just over three months the new arrangements will take effect. It is an ambitious timeline.

We understand that the AMC contract will end in February 2024. The ACMA will assume responsibility for all services as well as implementation of the new arrangements within this transition period.

It is fair to give credit to the ACMA where it is due. They received notice that the AMC elected not to renew the contract for Callsign Administration and Examination Services.

The ACMA recognised that there was no competent organisation with the capability to carry out these tasks and decided to do the work themselves. They have consulted at length and have received a large number of replies.

They have reached out to the Assessor network and have designed a new structure, which from their perspective balances the needs of the sector with the resources they have available.

The proposal documents are (mostly) clear, well written, and address many of the concerns raised by the sector. Thus far, the ACMA appears to be allocating the resources necessary to complete this transition.

While there is still need to fine-tune the model, had the ACMA not taken the matter seriously, the outcome for Amateur Radio could have been sub standard. The ACMA deserves some credit for their forward thinking initiative.

Here are relevant extracts from the ACMA proposal:

Class Licensing and Supporting Arrangements

We plan to implement the proposed class licence to authorise the operation of amateur stations in December 2023, to commence in February 2024. We plan for the amateur class licence to commence at the same time as the proposed new amateur radio qualification arrangements and the application component of the assessor accreditation scheme.

The proposed class licence, if made, will authorise the operation of amateur stations by amateurs who hold recognised qualifications at the foundation, standard and advanced level. It will replace the need for apparatus licences to be issued for such stations. The class licence will also authorise the operation of amateur stations by overseas visiting amateurs with recognised overseas qualifications and licences. Repeater and beacon stations will continue to be authorised under apparatus licences.

We intend to make minor changes to the draft class licence when it is made, including:

- changing the proposed definition of pY to rely on the definition in the Radiocommunications (Interpretation) Determination 2015
- adding a provision about the use of amateur stations in emergency services operations and training
- adding a provision about restrictions on connection to a public telecommunications network
- adding a note about the use of the AX call sign on specified dates.
- The class licence will also provide for the following:
 - new qualification regime
 - assignment of call signs by the ACMA, including specifying that call signs can be assigned for a time period and can be renewed
 - power for the ACMA to declare recognised qualifications.

Comment

For the most part, this is a confirmation that the Class License template will maintain most of the conditions that currently exist within our Apparatus License. The AX callsign usage changes have not been detailed and require further consultation.

Electromagnetic Energy Regulation

We are not intending to make changes to the categories of station that are considered low-risk. This is for two reasons: Firstly, the categories of low-risk station in the updated draft class licence are the same as the 'Level 1 criteria' stations in the Apparatus Licence Condition Determination (LCD).

We do not consider it appropriate to create different EME obligations depending on whether an amateur station is operated under a class licence or under an apparatus licence.

Secondly, we do not consider that relying on an individual's assessment of whether a member of the public is within 5 m of an amateur station is a suitable risk management strategy.

While we recognise that some submitters are concerned about how the EME requirements will work in practice, we note that the proposed introduction of the amateur class licence does not impose additional EME obligations on those amateur operators who currently hold non-assigned amateur licences.

Comment

This appears to be confirmation that existing EME policy will remain unchanged.

Amateur Radio Fees

The ACMA recently concluded consultation on the draft 2023–24 Fees CRIS on 7 July 2023, in which no changes were proposed to the ACMA hourly rates or current charges implemented on 1 October 2022.

The methodology for the calculation of the new charges is based on the ACMA's hourly rate for services, multiplied by the estimated time taken to conduct the activity. The hourly rate used for

the 2022–23 review was based on the net cost of services, which represented the actual costs incurred by the ACMA in executing its functions and activities for the 2020–21 financial year.

However, there are new changes proposed to the amateur radio framework and AWRL applications as indicated below:

Amateur radio:

We are consulting separately on proposed new amateur radio qualification arrangements and assessor accreditation scheme. Under the new arrangements, we intend to cost recover the ACMA's costs for issuing ACMA recognition certificates, assessing applications for recognition of prior learning, and assigning call signs.

Comment

There is a lot of detail in the proposed changes to the charging regime. The ACMA proposed fee schedule is a calculation of time taken to process an application, multiplied by their hourly rate of \$226 per hour.

We have prepared a synopsis of these fees in the table below:

| | |
|---|----------|
| Application for a Recognition Certificate for Advanced, Standard & Foundation) | \$45.20 |
| Application for Recognition of prior learning Certificate (via HAREC certification) | \$75.35 |
| (other than HAREC certification) | \$188.35 |
| Application for Next Available Callsign | \$30.15 |
| Application for specified 3-letter callsign (conditions apply) | \$41.45 |
| Application for specified 2-letter callsign (conditions apply) | \$52.75 |
| Application for Special Event callsign (conditions apply) | \$52.75 |

Reciprocal licensing arrangements for overseas amateurs operating in Australia

We proposed to extend the period of time that overseas visiting amateurs holding recognised overseas qualifications, who are currently operating under the Radiocommunications (Overseas Amateurs Visiting Australia) Class Licence 2015 (the Overseas Class Licence),

are authorised to operate a station while relying on their overseas qualifications – from up to 90 days to up to 365 days. This is reflected in the updated draft class licence. This would align the period of time that all overseas amateurs holding recognised qualifications or licences are authorised to operate amateur stations in Australia relying on those qualifications or licences

If overseas qualified amateurs stay in Australia for longer than 365 continuous days, they would be required to obtain an Australian qualification and call sign to be authorised to operate an amateur station under the proposed amateur class licence.

Comment

The ACMA maintains the position that in the long term, Amateurs in Australia are required to pass Australian exams. Foreign visitors can operate in Australia for up to one year under existing arrangements.

This policy aligns with the position RASA submitted three years ago. The ACMA included a statement that they will continue to recognise overseas qualifications used to obtain Australian licenses that were issued before September 2019.

Applying standards to Amateur Radio Equipment

What stakeholders told us

A few submitters responded on this topic. Submitters raised concerns about the applicability of standards to amateur equipment, given the experimental nature of the amateur service. In particular, that amateur operators' possession and operation of transmitters is not covered adequately under the current arrangements.

Our response

We consider that the current application of the Equipment Rules to amateur equipment remains appropriate. While we appreciate the experimental nature of the amateur service and that amateur operators do make changes to

their amateur stations, the Equipment Rules apply to most radiocommunications devices, including amateur stations, unless a permit has been granted or an exemption applies.

Comment

Existing regulations are provided for all Amateur Radio equipment, including home-brew or modified equipment.

The ability to build and modify our equipment is a fundamental part of our hobby.

It is our understanding that the status quo for equipment standards will remain unchanged.

Callsign transfer and Trading

We propose to implement the arrangements that we outlined in consultation paper – an amateur operator can surrender a call sign and nominate another person to whom the call sign could be issued. We also plan to place a limit on the number of call signs held, which is detailed below.

We intend to include more details on both of these arrangements in the call sign policy document discussed below.

Comment

This policy is self-explanatory. They will permit Amateurs to pass callsigns onto another designated person. There had been concerns that some may hoard callsigns or sell them for profit. There will be no change here. The cash for callsigns concern has not been addressed.

A 'regular check' on call sign use

We proposed a requirement for a call sign entity to issue a 'regular check' to confirm whether amateur operators were using their call signs.

In response to the feedback we received, we will carry out a regular check as proposed.

However, we recognise that concerns about call sign use may be greater for some types of call signs than others. We will therefore take a nuanced approach.

For special event call signs, we will conduct a check every 12 months. In practice, this will likely occur around every 9 months, when an amateur operator is provided with the opportunity to renew a special event call sign.

The VK0 and VK9 call signs will also be subject to a 12-month check. For 2-letter and 3-letter call signs, the check will be conducted every 5 years. However, we will be flexible with our timing. If we consider that demand and supply issues are emerging for some types of call signs, we will review the matter.

Comment

This is a logical progression for Class Licenses. Without annual renewals, the pool of available callsigns may be exhausted as people drift out of the hobby, or die. We agree with ACMA's proposal on a periodic check on the Amateur's callsign status.

Limit on the number of call signs held

We propose to introduce a policy to limit the number of call signs that any one person (including a body corporate) can hold. The ACMA's policy will be outlined in our call sign policy document that we intend to publish before the class licence commences. We intend to generally apply to 4 types of call signs:

Special event call signs.. a person should ordinarily be assigned no more than 2
VK0 and VK9 call signs - no more than 1
2-letter call signs - no more than 5
3-letter call signs – no more than 5.

The policy will not apply retrospectively. However, the proposed amateur class licence contains specific provisions about the cancellation of call signs, and we may decide in particular cases to exercise this power.

Comment

This arrangement seems reasonable. It leaves the ACMA with flexibility. It is our expectation that 'body corporate' is referring to a legitimate radio club.

Call sign assignment

As discussed in the August 2023 consultation paper, we will remain the entity solely responsible for assigning Australian amateur call signs – i.e., we are not implementing the proposal we consulted on, that a third party could become the 'Call Sign Entity'.

We will publish a document outlining the ACMA's policy on call sign arrangements before the class licence commences. It is intended to largely replicate the current call sign policy, outlined on the AMC website, with an updated policy to be published on our website.

Amateurs with a recognised qualification may apply to the ACMA for a call sign. We will consider the application and be guided by the call sign policy.

The call sign policy will outline changes to some policy positions outlined in the class licence consultation paper, including that on the policy about the number of call signs a person can be assigned.

Comment

The AMCA are stating they will maintain exclusive control over callsign allocations.

How will we know who is licensed and who is not?

Most submitters were concerned that amateur station information would not be included on the Register of Radiocommunications Licences once the class licence commenced.

Various reasons were put forward as to why some form of register was required. These included the need for a central repository to which amateur operators could refer to check the bona fides of call signs and qualification levels. Another reason was so that the amateur service could self-manage interference.

Submitters also pointed out the limitations of voluntary registers, including accuracy of the data.

Our response

We recognise the importance of this issue to amateur operators. Consequently, as stated in our August 2023 consultation paper, we will maintain a register of assigned call signs and a list of available and reserved call signs on our website. This will be available when the class licensing arrangements commence, planned for February 2024.

The register will detail:

- the call sign
- whether the call sign is assigned, available or reserved
- if assigned, the qualification level of the amateur to whom it is assigned.
- Personal details of amateur operators will not be available.

Operation under the amateur class licence means that an amateur operator acknowledges that their call sign and qualification level are available on the ACMA's call sign register.

Comment

Most Amateurs will probably view this position with some relief. ACMA will maintain a public database.

There is no indication of whether permission will be granted to download the data and use it for statistical, commercial or other purposes. RASA will seek clarification.

Amateur operating procedures

What we said

We reiterated our initial proposal to only include conditions in the proposed class licence that relate to the ACMA's spectrum management functions and responsibilities. Other aspects of amateur radio operation would be set out in amateur operating procedures that would be for the amateur community to develop and manage.

What stakeholders told us

We received only a couple of comments on this topic. One submitter recommended that the ACMA maintain ownership of the amateur operating procedures, which form part of the

Amateur Operator's Certificate of Proficiency (AOCP) syllabus for the practical examination.

Another submitter also advocated for a definitive reference for operational protocols for individuals preparing for examinations.

Our response

We propose to retain the amateur operating procedures on our website. We will update the amateur operating procedures (and syllabi) to incorporate the new class licensing and qualifications terminology.

Comment

RASA agrees with the ACMA's position that they will retain a copy of operating procedures on their website.

Arrangements for amateur clubs

We proposed that the operation of a club station would be authorised by the class licence, provided the operator of the station is a qualified operator or is supervised by a qualified operator. A call sign may be issued to a club that is a body corporate.

A person operating an amateur station may be able to transmit the club call sign if they are a member of the relevant club, or they could elect to transmit the call sign that is assigned to the individual operator – or both their call sign and the club call sign.

We recognise that an amateur club is not a natural person and therefore cannot hold a qualification. Our proposed call sign policy document, referred to above, will include information for clubs about call sign applications.

For example, consistent with existing requirements for the issue of an apparatus licence, only natural and legal persons will be assigned a call sign. We will therefore require proof that the club is a legal person.

We will also require proof that the appropriate person applying for the call sign is the holder of an advanced-level qualification.

Comment

As near as we can tell, the ACMA intends to maintain the status quo for Club Callsigns, in that a responsible Amateur must be present and that all operations will be limited to the grade of license of that responsible person.

If this summation is correct, then the approach is satisfactory, although we do query the inclusion of the requirement for the applicant to hold an advanced qualification. **This is not the case at present.**

It would be appropriate to determine the applicant's bona fides, e.g. Is the club a "legal person", and is the applicant authorised by the club to apply on its behalf?

There is no technical skill or knowledge involved in applying for a callsign. The safeguard is in the requirement for the station to be operated by a qualified person. We suggest that the applicant hold any Amateur Radio qualification.

How does the ACMA propose to determine if a club is a "legal person"?

What a scientific licence is for

A scientific licence lets you perform these activities for radiocommunications:

- research
- teach
- demonstrate
- trial, for example a new technology or product

Common users of this licence include:

- teaching institutions
- research bodies
- radio manufacturers
- people or businesses that design or repair radios
- people or businesses that sell radios

You cannot get a scientific licence to use:

- a non-standard transmitter, unless you have a permit
- transmitters covered by a class licence
- equipment that uses amateur frequencies

Responses to submissions on high power operations

Before breaking down this topic, some background is in order. RASA has lobbied the ACMA for three years to increase advanced licensee privileges from 400W to 1KW PEP. Responses to our proposal have been deferred several times.

Within these submissions, evidence has been supplied showing the low impact experienced by many other countries that have authorised

higher power levels by Amateurs.

In addition, RASA submitted a detailed paper confirming no reported impact to human well-being where 1KW transmissions are permitted. Before expanding further on this reasoning we must examine the direction that the ACMA is taking.

The ACMA appear keen to pursue a hybrid solution where some amateur operations would be migrated to Scientific & Research licenses requiring separate approvals from Accredited Persons and annual license fees.

RASA has already stated that this strategy is inefficient and unfit for purpose. The commercial objectives of a research license are inconsistent with Amateur Radio and there is no other country that has used commercial research frameworks for Amateur Radio.

Below are two extracts from the ACMA website.

The text on the left was taken on August 29.

The text on the right was taken on August 30
This document describes the commercial and

What a scientific licence is for

A scientific licence lets you perform these activities for radiocommunications:

- research
- teach
- demonstrate
- trial, for example a new technology or product
- repair and maintenance.

Common users of this licence include:

- teaching institutions
- research bodies
- radio manufacturers
- people or businesses that design or repair radios
- people or businesses that sell radios.

You cannot get a scientific licence to use a non-standard transmitter, unless you have a permit.

research nature of scientific licenses. Note that the document on the left has very specific exclusions for Class License transmitters and Amateur Radio frequencies. On the following day the revised page has these two limitations deleted.

There is an apparent desire to shoehorn aspects of Amateur Radio into the commercial Scientific License framework when class licenses are implemented. This action is occurring outside of the consultative process currently underway.

Here are extracts of what the ACMA have said in their Response to Submissions:

In the September 2022 consultation paper, we outlined our position to authorise high-power operations by advanced level amateurs on a case-by-case basis. This included the proposal for advanced level amateurs to seek authorisation to use high-power for scientific and experimentation use-cases in the short term, and to consider high-power operations for other purposes in the medium- and longer-term.

We proposed that advanced amateurs may apply for assigned scientific licences for certain experimentation uses, including reflecting signals from a celestial body, as well as intercontinental ionospheric and trans-equatorial propagation experiments. The consultation paper also requested suggestions for other amateur experimentation uses that require high-power that should also be considered under assigned scientific licensing arrangements.

Some opposition to the use of scientific licensing was based on a misunderstanding about the scientific licensing proposal. Submitters assumed that the scientific licence was intended to be used for all amateur usecases including communication with other amateurs and all (non-high power) experimentation.

Amateur operators may apply for assigned scientific licences for certain experimentation uses. This includes for activities such as reflecting signals from a celestial body, intercontinental ionospheric and trans-equatorial propagation experiment. We will publish guidance on the ACMA website in relation to the use of assigned scientific licensing arrangements to authorise the operation of highpower amateur stations.

Power increase for other amateur levels

Although the consultation paper did not raise this topic, several submissions suggested that we should consider increased power (proportionate) for all amateur levels.

Suggestions for foundation power level ranged from 30 W to 200 W. Suggestions for standard level ranged from 400 W to 500 W. Reasons given to support an increase for foundation and standard were for parity with equivalent licence levels overseas, to prevent being overwhelmed by stronger stations and to facilitate and encourage experimentation.

Submitters considered that high-power was needed for communication with amateurs outside Australia and to compete with international stations during HF contesting.

This was due to the distances involved and that many overseas amateurs operate on power levels greater than 400 W. As HF propagation conditions vary frequently and significantly, it is not possible to maintain a satisfactory/reliable service on 400 W.

Many submitters also identified a need to overcome a rise in the noise floor from domestic appliances and power lines.

Submitters generally opposed high-power in VHF and UHF bands. This was due to EME safety concerns and the potential for interference.

Interference

Submitters considered that there was a low-risk of interference from high-power operation in HF bands. While there was a potential risk in VHF and UHF bands, they claimed this was not established.

Comment

There is much to unpack here and we have not reproduced all of the stated arguments. At the end of this section the ACMA document furnished a particularly vague summary.

Our response: We intend to work through mechanisms and arrangements that could be put in place for a medium-term high-power authorisation. We will communicate next key milestones and proposed timing in the draft FYSO 2024–29.

Comment

The ACMA appear to have already made up their mind on this topic. In the bulletin released just one day after the above response they published the following statements:

The ACMA considers that any granting of higher power should be on a case by case basis – for example, through an apparatus licensing arrangement – and the ACMA is not inclined at this time to permit higher power operation under class licence arrangements.

Such case-by-case authorisations would involve a person applying to the ACMA for permission to operate a higher power station.

Interference and EME compliance risk would be assessed before approval. We consider that it should be incumbent on applicants to undertake their own due diligence (and bear application costs) for the interference, EME and EMC risks associated with their higher power licence. We would likely require independent assessment of interference potential and EME compliance.

Comment

RASA has lobbied the ACMA for several years now on higher power for Advanced Amateurs. The existing licensing framework and syllabus are adequate for this purpose. The Advanced Syllabus is aligned with the CEPT standard which permits amateurs at this level of competence in many other countries to operate higher power at limits (1-1.5KW) specified by their regulators.

As noted elsewhere, RASA has submitted a detailed technical paper highlighting the lack of any reported impact to human wellbeing where 1KW is permitted.

This paper can be seen [HERE](#).

This conservative position taken by the ACMA has not acknowledged the evidence demonstrating the low risks associated with the proposed higher power levels. The candid reality is that hundreds, if not thousands of 1KW+ power amplifiers are regularly being

used by Amateurs in Australia, and this has been the case for decades. That the ACMA appears to be unaware of the extent of this usage simply reinforces the benign nature of the technology currently in common use.

It is well known within the Amateur community that those wishing to use higher power (1KW+) do so, and this is evidenced in contest entries, casual discussions at club meetings and reference to amateur radio websites such as qrz.com.

We also note that the UK are undertaking a consultation on the same topic and there appears to be support for higher power.

We invite the ACMA to discuss the practicalities of higher power operation with the Presidents of the WIA and RASA at their next joint meeting.

It is possible that the ACMA has not adequately considered in-context the true duty cycle of transmitter equipment when used by Amateur operators. Most commercial and broadcast services are AM/FM broadcasts or digital transmissions that approach a 100% duty cycle. Such transmissions should be treated with respect.

However, the duty cycle of Amateur Radio transmission are typically between 25-45%. In real terms, the risk of exposure to high duty cycle RF fields is minimal.

Indeed, the ACMA's own guidance assumes 100% duty cycle and only calculates exclusion zones above 30MHz.

<https://www.acma.gov.au/our-rules-eme>

The practical reality, as demonstrated by local Amateur radio activity, as well as in numerous other countries, including our immediate neighbours, is that higher power at HF has no proven negative impact on human wellbeing or EMC considerations for Amateur Radio or other services.

Further enquires are being made with the

ACMA on this topic.

Fundamentally Amateur Radio is not a commercial activity and Scientific Licenses are inappropriate. Advanced Licensees have already satisfied the technical requirements (CEPT compliant syllabus) to safely operate higher power at HF.

Implementing the Class License

We intend to make the proposed class licence to authorise the operation of amateur stations in December 2023. We plan for the amateur class licence to commence in February 2024, at the same time as the proposed new amateur radio qualification arrangements and assessor accreditation scheme.

All qualified amateurs will be authorised to operate under the proposed class licence, even if they hold an amateur licence, as long as they comply with its conditions. Non Assigned amateur licences will continue in force until they expire, or they can be surrendered. If you surrender your licence, you may be eligible for a partial refund of the transmitter licence tax.

Upon the class licence's commencement, the ACMA intends generally not to issue new non-assigned amateur licences, and to not to renew existing licences. We are considering making an instrument under section 103A of the Radiocommunications Act 1992 to prevent renewal of existing licences (see August 2023 consultation).

Transition letter

To assist in a smooth transition to class licensing arrangement, around a month prior to the class licence's commencement, we will send all current non-assigned amateur licensees a letter that will confirm whether they are authorised to operate under the class licence and include their qualification level and call sign (transition letter).

The ACMA intends that the transition letter can also be used for advanced amateurs travelling overseas to demonstrate to that overseas jurisdiction their ability to operate an amateur

station in Australia.

Our preference is to send the letters by email wherever possible. Where we do not have an email address, we will send the letter by mail. We therefore encourage each licensee to make sure that we have a current email or postal address for you.

If there is any doubt, or to update your details, please check your details on ACMA Assist, or you can contact our Customer Service Centre by email at info@acma.gov.au, or phone 1300 850 115.

ACMA recognition certificates

After commencement of the proposed amateur class licence, we will be issuing new qualifications. These will be ACMA recognition certificate (Advanced), ACMA recognition certificate (Standard) and ACMA recognition certificate (Foundation).

Public register

We will maintain a register of assigned call signs and a list of available and reserved call signs, on our website. This will be available at the same time as the class licence commences.

The register will detail: the call sign, whether the call sign is assigned, available, or reserved.

If assigned, the qualification level of the amateur to whom it is assigned.

International reciprocity arrangements

For amateur advanced operators, the letter of confirmation referred to above will include text that meets CEPT Recommendation T/R 61-01 requirements.

We will notify the CEPT that, on its commencement, the proposed amateur class licence will authorise the operation of non-assigned amateur stations in Australia. We will also notify CEPT about the ACMA recognition certificate (Advanced) referred to above.

Comment

These proposals are reasonable mechanisms to transition licensees from the existing Apparatus License to the Class License.

New amateur assessor accreditation scheme and qualification framework

We are proposing a new qualification framework that will retain the current qualification levels – foundation, standard and advanced. It will also continue to recognise qualifications that were obtained or recognised under the current framework.

Qualifications, called 'ACMA recognition certificates' under the new framework, will be issued by us. This will be on application from a person who has passed a relevant amateur radio examination or recognition of prior learning (RPL) assessment. The new framework also outlines a process where amateur operators can have their internationally obtained amateur radio qualification recognised through RPL.

We propose to use a network of voluntary assessors to conduct amateur radio examinations under a new scheme to be managed by the ACMA. These assessors will be suitably qualified, experienced amateur operators who meet various requirements.

The consultation paper includes draft Accreditation (Amateur Radio Examination) Rules 2023 (the draft Accreditation Rules). These will provide a formal accreditation framework for amateur radio assessors and outline requirements to become an assessor.

We have also drafted Accredited Assessor Guidelines, which contain operational and conduct requirements for assessors. We propose to commence some aspects of the Accreditation Rules during December 2023. This will allow us to bring current AMC assessors on board prior to the class licence commencement.

We plan to start accepting new applications from those seeking to become an accredited

assessor from February 2024.

Comment

This new Assessor Accreditation scheme is necessary as ACMA transitions from the 3rd party model administered by the AMC. There is too much detail to unpack in this edition of QTC. What is critical is that the existing pool of accredited assessors are properly informed, managed and appreciated by the ACMA. They perform an important task for free; a cost that would otherwise impose huge fees on the Sector..

The ACMA must continue to liaise with and listen to the assessors. These are the volunteers who perform the work and provide the pathway to Amateur Radio for newcomers. Provided the ACMA continues to consult with and accommodate the assessors and students, the future of Amateur Radio is assured.

Summary

In this synopsis we have focused on the key aspects of ACMA's Consultation Papers.

The process the ACMA has undertaken to implement Class Licensing is for most part a reasonable and structured approach.

We remain extremely concerned at ACMA's attempts to shoehorn certain privileges into the Scientific Licence regime, and a continued delay to approving higher power for Advanced Licensees.

As a National Representative Body, RASA welcomes feedback from the amateur community.

The turn-around time for this consultation is tight. If you wish to send your response on any or all of the issues, you can send it to info@vkradioamateurs.org

Alternatively, you can use the ACMA's direct, online response page.

Insurance for Amateur Radio Clubs

An investigative article by WA Amateur Radio News.

The topic of insurance for radio clubs is both complex and varied. Following some recent revelations regarding coverage (or lack thereof) with the WIA Affiliated Insurance we felt it would be useful to provide readers with some information on this topic.

In keeping with insurance industry culture, nothing in this article should be construed as advice and clubs should make their own enquiries. Hopefully this article will at least provide your club members and committee with some talking points as well as providing some clarification.

Broadly speaking there are three types of insurance Amateur Radio clubs will consider:

Property Insurance

This covers any buildings a club may own. Building insurance can cover your building for loss or damage caused by insured events, such as fire, flood, storm, theft and power surge burnout.

Contents Insurance

This provides cover for club assets (not buildings). Contents insurance covers the financial cost of repairing or replacing your club's possessions and furnishings, such as curtains, furniture, white goods, equipment, TV, computers and other electrical appliances, clothing, jewellery, sporting equipment and even toys. It may even cover your tower and antennas, but you'd need to check this with your insurer.

Public Liability Insurance

Public liability insurance covers you for third party death or injury. It helps protect you and your club when you're liable for negligence. For example, if your club causes: injury or death, such as your food making a person sick, personal injury resulting from use or misuse of club equipment and maybe even accidental injuries, such as tripping over an antenna cable.

It is easy to assume that Public Liability Insurance is all-encompassing. And anecdotal evidence suggests some clubs assumed they have coverage for "everything" under the WIA arranged Public Liability Insurance.

Many clubs use the WIA referral for Public Liability Insurance. Following a change in the arrangements for insurance, the WIA has announced a new provider, GippsInsure.

<https://www.wia.org.au/newsevents/news/2023/20230315-40/index.php>

In the course of our enquiries we were informed that "The previous (WIA) insurance only covered third parties, not club members at all. This is why we sought new coverage for clubs (sic)" (Ref: email from WIA Secretary, 13 June 2023).

Clubs, and their members, have been very fortunate indeed that there has been no need for claims under the old policy. For many years, it is likely clubs have been working with the assumption that the WIA insurance covered their own members. In spite of an advertised benefit of membership being "Public Liability Insurance" for your local club, many would have assumed this included members. It seems this has not been the case.

WA Amateur Radio News recently wrote to the Broker seeking clarifications on the new policy.

We received the following responses.

| | |
|---|---|
| Sector events held at premises hired by the insured (not at the normal place of business) – e.g. we host a symposium over a weekend – we hire a public hall and host presentations, demonstrations of radio equipment, antenna etc. | Policy has an Events endorsements added to policy schedule – Excludes: any event with more than 250 attendees unless agreed by Keystone. For full details of the endorsement refer to schedule |
| Outdoor events such as field days | As above – if hosting/ organising Trade Fairs, Shows and Markets 3.11 Keystone will indemnify the Insured under the Insuring Clause or the Extensions for any claim in respect of the Insured's attendance at a conference, trade fair, show or other similar event. |
| Liability associated with the loading and unloading of vehicles at events | PDS Exclusions Page 11. Motor Vehicles 5.29 – cover added back in – refer to PDS |
| Using public facilities such as BBQ, picnic areas at club sponsored events | As above |
| Public liability when Performing maintenance on antenna towers and antennas at the top of radio towers and masts | Excluded: Those that carry out Installation of antennas on commercial communication sites themselves. |

We then attended the WIA facilitated Q&A session with the Broker, Steven Bingham from GippsInsure.

Mr Bingham was helpful and explained that dealing with the WIA, clubs and amateur radio had been a journey of learning, as both he, and the Insurance Underwriters came to terms with our hobby and its unique insurance requirements. He was also clear that the information provided in the session was general in nature and any specifics must be answered by the underwriters.

When clubs complete their application forms it is incumbent on the club to be honest with the Broker and Underwriter regarding their business and activities.

The following clarifications were provided:

- Broadly speaking the policy provides Public Liability coverage Australia wide for meetings, symposiums, swap meets and sausage sizzles.
- The policy does not differentiate between WIA members and non-members
- Members of the public are covered
- Any event (in this case a Hamfest) with more than 250 attendees must receive additional endorsement by the insurer. As an example, one club requested an endorsement for an additional 100 attendees, and the increase in premium was in the order of \$150 per year.
- Unincorporated clubs are not eligible for cover; they can't enter into contracts, and this includes insurance contracts.

The policy does not cover property or contents. Your repeaters, radios, towers, and club rooms are not covered by this policy. You will need separate contents and building policies if you require such coverage.

Some of the more complex scenarios were then raised, such as club members working on club

infrastructure, such as towers, masts, and antennas. Other questions related to club equipment (e.g. a repeater in a shared site) causing damage to other users' equipment. The questions centred around public liability coverage in the event of a misadventure resulting in damage to property or persons.

We have also seen and heard of potentially dangerous activities such as:

- Members climbing towers in running shoes with no hardhats, personal protective equipment (PPE) or harnesses. Often times, there is no or minimal risk mitigation
- No consideration for the Work Health and Safety Bill with regards to working at heights, special certifications or qualifications and documented procedures for safety
- Ladders on the roofs of vans and trailers to install lights and equipment at Hamfests
- Limited or no OH&S supervision at events where inherently risky tasks are being undertaken.

One attendee works in the communications industry and informed those present of the following requirements when working on towers in a commercial setting:

- Working at heights: any work over two metres requires Working at Heights qualifications
- Elevated platforms considerations
- Risk management: need a plan to recover a person from the top of a tower.
- Use of harnesses, and compliance with inspections
- Use of Personal and Protective Equipment
- Requirements to use qualified riggers.

Also, we would pose questions such as:

- Does your club use a professional or licensed rigger to climb towers?
- How often are your tower/s inspected for safety and engineering compliance?
- Does your club have a risk plan? How often do you conduct a risk review and develop a response or mitigation plan?

Would your club be covered if your committee was not undertaking a responsible approach to safety, OH&S and potentially dangerous activities?

So much of what we do as radio amateurs has a level of risk associated with it; especially when it comes to towers, antennas, and related activities. Perhaps what's most important is ensuring your club is overseeing such activities in a responsible manner, and that anything involving a high risk is managed accordingly.

- Maybe your club should consider an Insurance review: do you understand your insurance policies, and do you have the cover you need?
- Risk Management: has your committee reviewed the risks your club, its members and the public are exposed to? Do you have a mitigation plan?
- Safety Officer: a dedicated member who has an understanding of the Work Health and Safety Bill, OH&S and can act as an advisor to committee
- Maybe your club could team up with other clubs to share costs in getting member/s qualified in Working at heights and Basic Riggers certifications?

Summary:

From what we've learnt, many clubs were unaware of what the "WIA Affiliation Insurance" product provided for many years. It appears very few knew that their own members were excluded from the cover. Indeed, we'd even suggest the WIA was unclear, otherwise, surely, they would have alerted

clubs?

Insurance and public liability has become a complex business. Australia is number two in the world for litigation, second only to the USA. So it's a real risk, and one that every club should consider seriously.

If your club has a tower, undertakes field days, or sponsors any high-risk activities, your committee would be well advised to write to the Insurer seeking clarification in writing. Don't wait until you need to make a claim.

Has the time come for clubs to consider amalgamating, to share resources, costs and benefits?

References:

Some definitions from Birch Grove Legal:

An employee

There is a legal duty under common law to take reasonable care to avoid exposing employees to likely risks of injury.

A volunteer

If an organisation falls within the WHS laws, then it will owe duties to all workers, including volunteers.

Organisations that are completely run by volunteers (ie with no employees) do not owe duties to their volunteers under WHS laws. However, if an organisation has at least one employee, it will owe WHS duties to all workers.

<https://birchgrovelegal.com.au>

"It wouldn't happen to us..."

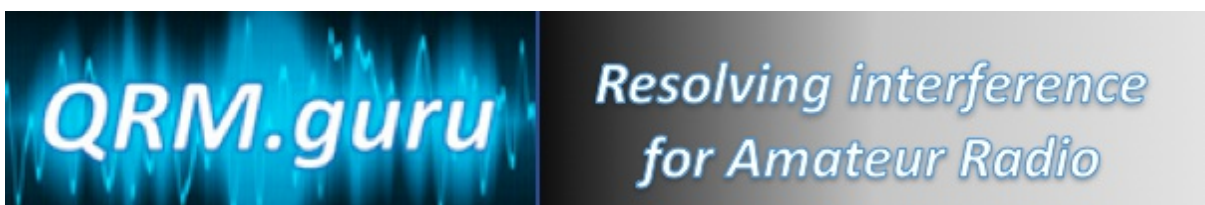
In any of these scenarios your organisation and/ or your board members could be considered legally responsible.

- A volunteer trips over in your office and breaks their wrist
- A volunteer driver has a car accident, damaging another car
- A professional volunteer gives advice that turns out to be wrong, causing the client significant harm
- Event participants damage the hall you have hired
- Someone has an allergic reaction to food that has been wrongly labelled
- Your computer system is hacked and confidential client files are exposed
- An officer commits a fraud right under the nose of the board
- Your partner organisation goes bankrupt leaving a trail of debts

<https://www.volunteeringvictoria.org.au>

Further Useful Information

<https://www.volunteeringaustralia.org>

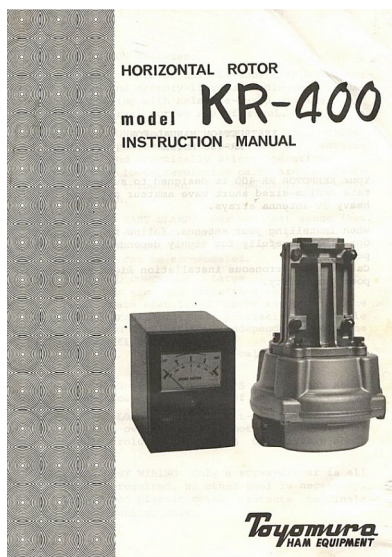


One Good Turn Deserves Another

The challenge of resolving antenna rotator problems by Ian Jackson VK3BUF

My various coax cables from the shack to the tower were old. I suspect some of them date back to 1978 when I built the tower and losses above 30 MHz were pretty nasty. Additionally, I had odd puddles appearing on the shack bench. After initially abusing the cat for incontinence, I found that it was simply water oozing out of the sheath of the 7-core antenna rotator cable during heavy rain.

I resolved to replace all of the cables with some fresh runs of RG213, LL400, rotator cable, and a few accessory wires. These were all pegged out on the ground and collectively pulled through the 80mm PVC pipe that led from the concrete in the tower base to the slab floor, about 20 metres away. Previously, the cables snaked untidily in different directions from this hole in the floor like the roots of an inverted tree. This time I got keen, hauled the fresh cables into the wall cavity and terminated them all on a patch panel above the bench. Much nicer.



Back at the tower, I set about terminating the cable onto the rotator and noticed that the screw terminal cover was corroded. The screws didn't want to come out. There were no antennas on the rotatable pole at that stage. They had become somewhat decayed over recent months and bits of aluminium had progressively fallen from the sky.

It seemed wise to unbolt the rotator for an

inspection before terminating the cable. To be fair, it was not a new rotator. It was a classic Kenpro KR400. I had a vague recollection of oozing a bit of grease into it back sometime in the 1990's. Perhaps it was time to ooze a bit more into it. I received something of a shock when I removed the covers from the rotator and discovered a fused ring of iron and aluminium oxides where the bearings should be. The unit looked like it had been submerged off the coast of a Greek island for about 2,000 years. (Assuming ancient Antikytherans had been into ham radio.)



I looked at my wristwatch, called time-of-death, then pulled up a web browser to search for a replacement rotator. This brought about a second shock for that day. Antenna rotators had become expensive. There was not going to be much change out of \$1,000!

It was back to the relic for a closer examination. Placing the remains on a clean tray, I slowly chiselled out the solidified balls. This was hard work. In total, I recovered 98 ball-bearings.

The inside shells of the rotator were coated with



white oxides. Surprisingly, the motor and gear train was still in fair condition. No drive teeth were missing. I had little to lose by trying some refurbishment before shelling out much bigger dollars for a new unit.



The first step was to give all surfaces a good wire brushing. I tried a chemical fix by submerging the frostier parts in a mild caustic solution for a few hours. That didn't help as much as I thought it would, so I spent an extra hour with sandpaper and a flat bladed screwdriver scratching out the



corrosion, while watching a movie. I think it was True Grit.

The bearing race had bigger problems. There were dimples corroded into every bearing position. Even if the channels were thoroughly cleaned, like a sad teenager, the balls would have to ride out of their depressions before they could move again.

I have a metal lathe in the workshop, so I progressively placed each bearing surface in the chuck and with a rounded cutting tool shaved off as much material as I safely could, without compromising its structural integrity.

This re-work also meant that when I approached the lady at the local bearings suppliers, I had to concede that my balls were now too small.



She had a micrometer handy and we determined that 100 new 10.1mm balls would replace the original 9.4mm ones quite nicely. They had to be ordered in. Total cost: \$65.

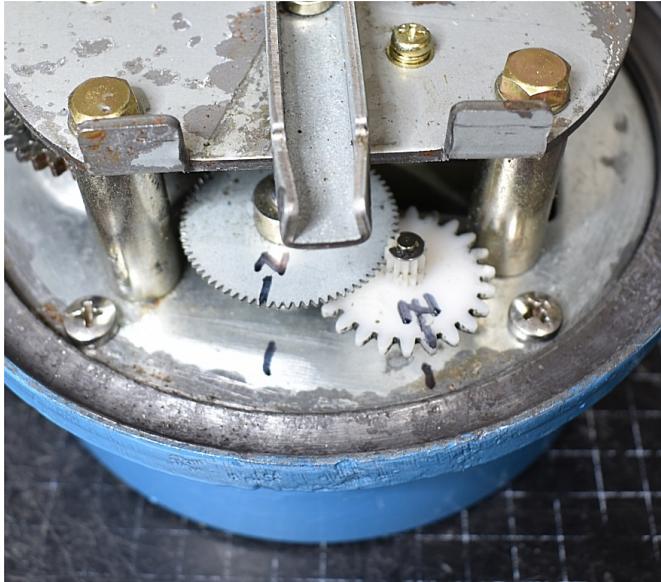
The 8mm threads in the top and bottom of the rotator casing were also corroded and the bolts had rusted. With some difficulty, I removed these old bolts, ran an 8mm bottoming tap in each thread, then lightly greased the insides of the holes.

The next step was to give the exterior a bit of sprucing up. The original grey coating had mostly disappeared. A quick look around the workshop turned up half a tin of sky-blue spray paint. (More specifically, Ford tractor blue.)



When reassembling a rotator, it is important to be mindful of the relative position of the internal

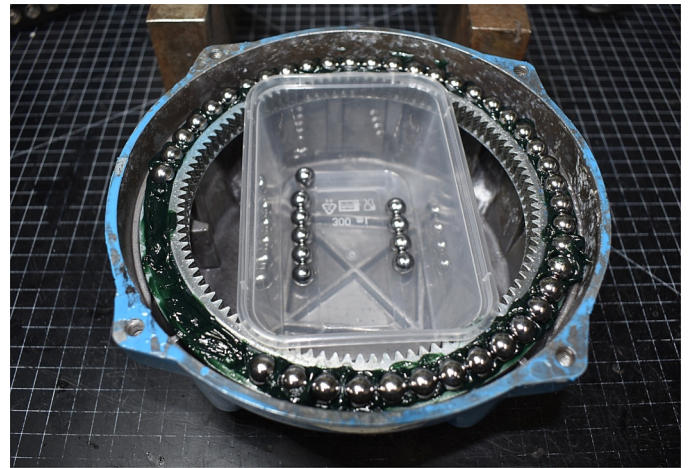
potentiometer and backstops. I connected the controller up to the rotator and turned the potentiometer cog until the needle pointed North. This was marked to ensure it didn't get bumped before reassembly. The top section was similarly marked to ensure that the backstop lug cast into the lid was exactly 180° away from the backstop arm.



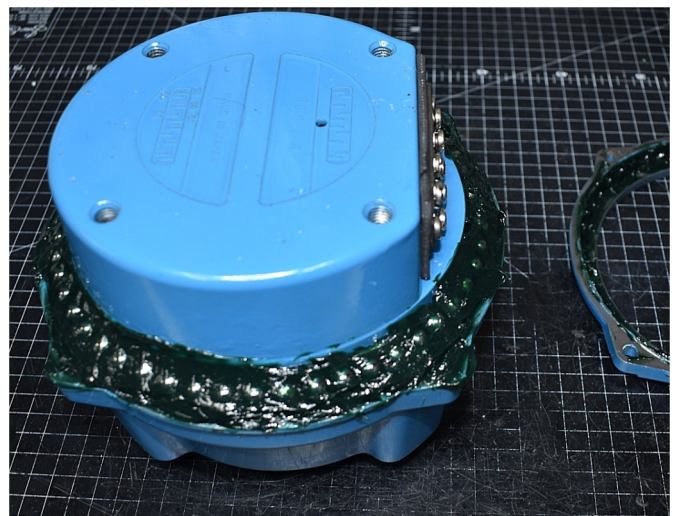
During reassembly, I used a tube of Penrite lithium based marine wheel bearing grease. This should act both as a lubricant and as an anti-corrosion barrier. The grease was buttered onto all bearing surfaces.

The task of loading up the new ball bearings now commenced. This took a little while with a butter knife. When the balls were pushed into position in the grease, they didn't move much. This kept them stable while the various sections of the rotator were reassembled.

After the top race was loaded and the top casing was restored, the unit was inverted so that the bottom race could be given the same treatment.

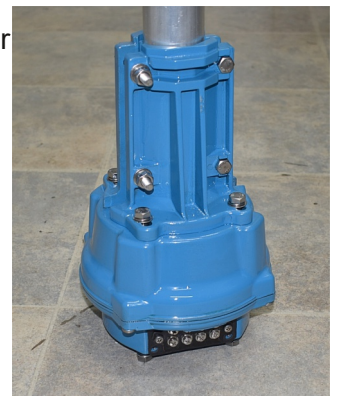


As part of the refurbishment process, I replaced every screw and bolt with a quality stainless steel substitute. It will make it easier to service next time. This will be due in about 2050.



The reassembled rotator came together well, with just the right amount of grease oozing out of the joins as the sections screwed together. A quick reconnection to the rotator control box confirmed that I had a full 360° of easy travel from backstop to backstop. The 180° mid-rotation point of the rotator corresponded with the needle pointing exactly North on the azimuth meter.

Finally it was time to re-install the rotator on the tower.



When any hardware is added to a tilted tower it is important to visualise where the connections will be when the tower is raised. Rain will cling to cables and run down them, so whenever a cable enters a terminal block, it must go lower than the block, then

feed up to it, rather than running it directly to the terminals. If not, there is a risk of water penetrating the terminal block, giving bad direction measurements and inviting more corrosion. To be safe, the entire terminal strip area was covered with a thick self-amalgamating tape.



The end result was pleasing. The repair had cost just \$80 and as near as I could tell, it was back to original capability. However, the down side of painting the rotator a pretty sky blue is that on a nice clear day, if I look at the tower from the ground, it appears as though the rotator has been stolen.



Now the rotator is in place, it is time to add the HF beam antenna.

**Resolving interference
for Amateur Radio**

Since its creation QRM Guru has had:

**140,108 unique visitors from over 150 countries
with 433,577 page visits
Typically 150-300 visitors/day
(as at 8 August 2023)**

RASA representatives have made QRM GURU presentations to many Amateur Radio Clubs within Australia and internationally. Where practical, presentations in Australia can be face to face, however many have been done via ZOOM.

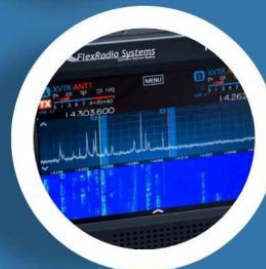
Would you like to book a QRM GURU presentation for your club?
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3100R 60 Watt VHF
Transceiver Value \$200



Experiences With Balloon Antennas for 80m and 160m

By Elmar Compans, DF4GV

Foreword by Chris Chapman VK3QB

Whilst on Norfolk Island in March 2023, I received an email from Elmar asking if we could try for an 80 metre QSO. Elmar explained he was experimenting with $\frac{1}{2}$ wave verticals using balloons. This seemed like a fascinating opportunity to work some DX on 80 metres, as well as assisting Elmar with his experiments.

We were successful in making the contact. At our end we were using an 80 metre doublet about 30 metres high, strung between two Norfolk Island pines. Elmar was using his $\frac{1}{2}$ wave balloon vertical. Thanks to Elmar for making the effort to reach out to us and also for the reasonably difficult DX contact on 80 metres.

During Covid I decided to upgrade my CW DXCC to 5BDXCC. However, this was hopeless on 80m with my low hanging doublet antenna. For DX, vertical antennas are significantly better. I therefore started experimenting with vertical full-size half-wave dipoles carried by a balloon. Unlike quarter wave radiators, vertical half-wave antennas do not require radials and are therefore more straightforward to deploy.

Unlike a permanently installed antenna, however, a balloon antenna is only ever set up temporarily, and it can only be operated in sufficiently calm weather. So, in addition to observing the RF propagation conditions, knowing the wind forecast is also essential.

My balloon antennas work for DX as I had hoped, and I have also tried 2 element Yagi configurations with good success (Fig. 1). Also tests on 160m were successful for DX at the first attempt. I report about my experiences with balloon antennas in the following pages and hope to inspire others to conduct similar tests.

Measurements on my antennas and components were made with a VNWA [1], antenna simulations with the simulation program EZNEC Pro/2+ from Roy W. Lewallen W7EL. For ground quality I assumed "real" for the simulation, which should be close to the conditions at my home. For the qualitative practical evaluation of my antennas I used the worldwide RBN network and internet-connected kiwi-SDRs as well as occasional comparative transmissions of ham friends.



Fig 1. balloon antenna for 80m in 2el Yagi config; balloon height 55m.

The antenna permit

A balloon antenna is – legally speaking – a tethered balloon. In Germany, an official permit is required for launching a balloon to a height of more than 30m, because of the possible danger to air traffic. The maximum height to be applied for is 55m for the 80m band and 100m for a 160m antenna. The permit was granted quite quickly (about 2 months). My permit currently allows the simultaneous use of up to four tethered balloons to a climb height of up to 100m from my property.

The antenna diagram

For a vertical half-wave dipole, the elevation diagram depends essentially only on the height of the dipole above ground and the RF quality of the ground at a great distance from the antenna location. Figure 2 shows the elevation diagram for a height $h = 4m$ of the lower dipole end (EZNEC simulation). Such an

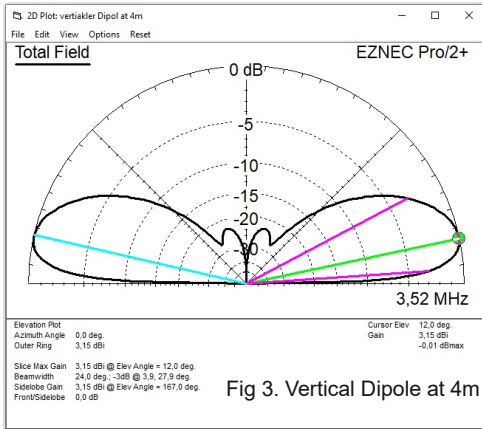


Fig 3. Vertical Dipole at 4m

antenna has good DX characteristics: elevation of the main lobe 12°, -3dB angle 4°, gain 3.2 dBi, hardly any vertical/steep radiation!

With a height (h) of the lower end, the dipole center has a height of (h + λ/4). The interference of the wave radiated by the dipole at +(h + λ/4) with that of its mirror image at -(h + λ/4) results in nulls in the elevation diagram at those angles αnull at which these two waves cancel. Analogous to the theory of the optical double slit [2], the first null is at: $\sin(\alpha_{NS}) = (\lambda/2) / (2*(h+\lambda/4))$

Therefore, the height (h) of the dipole should be chosen to support the formation of a flat main lobe, simultaneously avoiding steep side lobes. In Fig. 2 with h = 4m, this is well achieved (αnull = 57°). With increasing height h, the first null moves to smaller angles. At a (lower) dipole height of h = 15m, therefore, distinct steep side lobes remain (Fig. 3). However, the main lobe is then even flatter (10°; -3dB at 3°), with almost the same gain.

The -3dB angle of about 3-4° is determined by the RF property of the ground at a large distance from the antenna (>500m) and therefore cannot be influenced by radials under the antenna [3]. But a -3dB angle of 3-4° already at average RF ground quality is not bad at all.

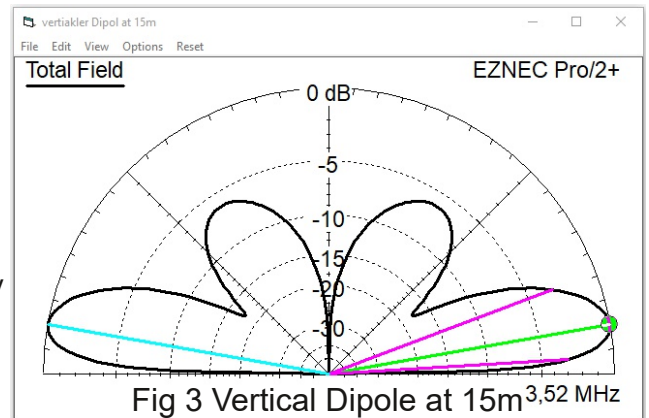


Fig 3 Vertical Dipole at 15m 3,52 MHz

The feeding of the vertical half-wave dipole

A vertical 80m half-wave dipole as a balloon antenna typically starts at a height of 5 to 10m and ends at a height of about 50m. The center feed, which is otherwise common for dipoles, is therefore not possible and the so-called "end feed" is used. This means a suitable power feed at or near the end of the dipole. Ham literature is not only full of suggestions and opinions, but also of vividly expressed differences of opinion.

In practice, two solutions are recommended: the J-feed with a λ/4 transformer and the off-center feed of the dipole, which is less frequently discussed in the literature. I have implemented both and both work very well. The off-center feeding of the dipole is very space-saving, but requires a highly effective common-mode choke, which is not easy to realize. I therefore describe only the J-feed here. It can be easily calculated and designed. First, the λ/4-transformer is built and tuned to the correct frequency by shortening. The λ/4-transformer does not have to be perfectly linear. Then the half-wave antenna is connected and also tuned to the desired frequency by shortening. When shortening the antenna, keep in mind that the overall resonant system has a length of λ (half-wave dipole plus λ/4 transformer). An increase of the resonant frequency by 1% therefore requires a shortening by 1% of λ.



Fig 4 DF4GV With two balloons

The antenna material

A balloon cannot carry much weight. All antenna parts above the feed point must therefore be very light. Solid copper wire does not have sufficient tensile and bending strength and is therefore neither suitable nor legally permissible. Fiber-reinforced antenna litz made of 0.3 sqmm Cu with a weight of approx. 4g/m and a breaking load of 60kg has proven to be perfect. Compared to a hypothetical loss-free wire, the

antenna gain decreases by approx. 0.3 dB due to ohmic losses. Strain reliefs and thimbles are very important. I wind the antenna on a cable drum, which is very convenient for releasing and retrieving (Fig. 4).

The balloon

The most suitable balloons are meteorological balloons. However, meteorological balloons are not good for continuous operation and – as tethered balloons – they last only a few days. Especially in summer when they are exposed to UV radiation during daytime. In winter, they keep much longer.



Fig 6 Beacon Light Mounted

Filling gas can be helium or hydrogen. Helium is about 7 times as expensive as hydrogen. However, hydrogen is flammable and explosive when mixed with air. I strongly advise against hydrogen to anyone who is not already sufficiently experienced in handling flammable gasses.

One of the requirements of my permit is a light beacon at the balloon at night. For this purpose, I have developed a small circuit with three red high-power LEDs, powered by three CR2032 button cells (Fig. 5). At night, this light beacon at the balloon can be seen from a large distance (kms). The three button cells last for a whole night (approx. 14 h) with full illumination intensity. The button cells must be replaced before each night. The circuit weighs about 24g including the button cells (Fig. 6).

Since the antenna wire extends high into the atmosphere, the antenna must not be left up during thunderstorms – not even during distant thunderstorms.

The balloon itself and all antenna parts to be carried by it above the feed point weigh about 410g for the 80m antenna. Moisture or frost tends to accumulate on the balloon skin and/or the antenna wire at night. Also, each balloon loses some gas overnight. To ensure that there is enough pull at the lower end of the antenna for the entire night and that the antenna wire does not hang "slack" in the morning, it has proven useful to fill the balloon (with light beacon mounted but still without antenna) in the evening so that it "pulls" with approx. 800g. For this you need about 0.8 cbm H₂ or He. This filling is sufficient for one night. For use in the following night, a part must be refilled. If there is a danger of fog with frost, then more gas should be used.

Vertical Yagi Arrangements

With a second balloon and a director wire, the half-wave dipole can easily be upgraded to a 2el yagi (Fig. 1). The length and spacing of the director were optimized by EZNEC simulation (director length = 39.35m; spacing = 9.37m; lower director end at 6m height). This results in a (simulated) gain of about 6 dBi, a forward/backward ratio of about 8 dB, and an unchanged flat elevation beam angle of 12°.

By simulation I could show that within the limits of my garden another (reflector) element does not convincingly improve the radiation characteristics further. Therefore I did not realize a 3el configuration. However, OM Rudi DK7PE has tried a 3el configuration on free field (i.e. with optimal distances) with great success at the beginning of 2022 and has made a very worth seeing video documentation about it [4].

Practical experience

As often observed with vertical antennas, also with my vertical half-wave dipoles early evening noise levels were sometimes high. However, at night when the LED lights of the neighbors were off, the

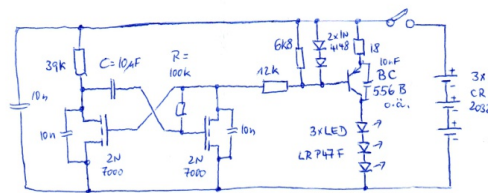


Fig. 5. Circuit diagramme of balloon illuminator

reception quality was surprisingly good.

Initial transmission attempts were qualitatively assessed using RBN and various non-European kiwiSDRs, which can be listened to in real time via the Internet. Whenever European stations were received, the signal from my balloon antenna always came through, and was of very good signal strength.

The antenna passed the acid test in the CQ World Wide DX Contest CW in a 10m arrangement and 500 W all DX stations were reached. Usually a few calls per hour. Only 3B8M could not be reached because my antenna was initially pointing north. "rehanging" the director element for beam direction south then also 3B8M was reached. This proves the useful directivity. In the following time also VK and ZL were reached. There was a successful 80m CW-sked with VK9NT in March 2023. For the sked session the antenna was pointing NE, my Yaesu FT-DX 10 and a 500W PA.

Balloon antenna for 160m

Encouraged by the positive experiences on 80m I then also tested balloon antenna for 160m. Balloon height is then an impressive 100m. Because of the higher antenna height a 2el-Yagi is necessary. I also tested a 2el-Yagi configuration for 160m (Fig. 7). Due to the small garden, the distance between radiator and director was significantly shorter than for 80m. Nevertheless, this arrangement also worked well - in the CQ World Wide DX Contest 2023, all DX stations heard could be reached without any problems.



Fig 7: Vertical Yagi for 160m

Summary

In the 1+ year of experimental work with balloon antennas, I learnt a lot about antennas, end-feeding, antenna measurements and simulation, and a lot more. They are wonderful antennas. But most of all, it was (and continues to be) a lot of fun. And yes – the 80m part of 5BDXCC was completed in no time.

Sources:

- [1] DG8SAQ-VNWA from SDR-Kits
- [2] this can be found in any physics book on wave optics
- [3] John Devoldere, ON4UN, "Low-Band DXing", fifth edition 2010, ch. 9.1 by Uli Weiss, DJ2YA, p. 9-3 ff.
- [4] <https://youtu.be/vxmCxjSCop0>

About the author

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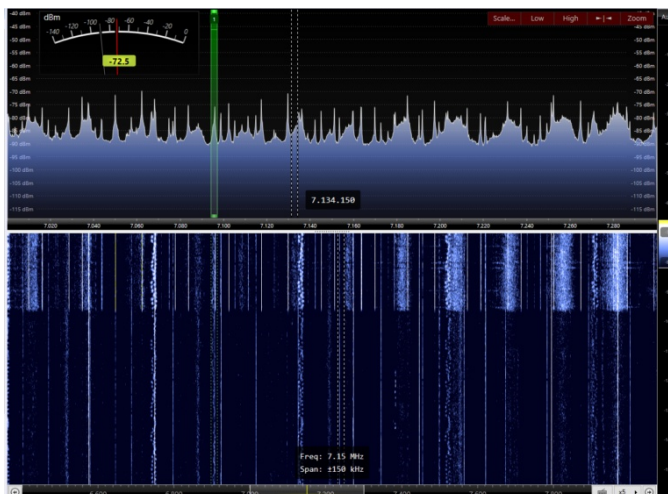
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